

REMARKS

Applicant respectfully requests reconsideration of this application in view of the following remarks.

Status of the Claims

Claims 1-44 are pending. Claims 1-13 stand rejected under 35 U.S.C. § 101 because the Examiner believes the claimed invention lacks patentable utility and practical application.

Claims 14-26 stand rejected under 35 U.S.C. § 101 because the Examiner believes the claimed invention is directed to non-statutory subject matter. Specifically, the Examiner believes claim 14 is directed to a computer program listing.

Claims 27-44 are allowed.

Claim 14 was objected to and has been amended. No claims have been canceled. No new claims have been added.

Reconsideration of this application is respectfully requested.

Response to Rejection of Claims 1-13 under 35 U.S.C. § 101

Claims 1-13 stand rejected under 35 U.S.C. § 101. The Examiner asserts that the claimed invention lacks patentable utility and practical application and refers Applicant to page 30 of the Interim Guidelines. Applicant traverses and asserts that the language in claim 1 meets the 35 U.S.C. § 101 requirements for utility and practical application.

Claim 1 reads:

A method comprising:

measuring phase noise in a signal, the phase noise due to a sampling-time mismatch between a transmitter device and a receiver device;

determining a Gaussian noise power level in the signal;

calculating a gain factor associated with the phase noise; and

applying the gain factor to the Gaussian noise power level to calculate an equivalent noise power.

Thus, claim 1 is for a method to calculate an equivalent noise power.

Page 30 of the Interim Guidelines, which was cited by the Examiner in the rejection of claims 1-13, shows a flowchart for determining subject matter eligibility. Unfortunately, the Office Action does not indicate why the Examiner believes claims 1-13 lack patentable utility and practical application, and in particular it does not indicate whether the Examiner believes the claims are directed to a judicial exception of 35 U.S.C. § 101 rather than to a practical application of a judicial exception to 35 U.S.C. § 101. Thus, rather than speculate as to exactly why the Examiner rejected the claims, Applicant traverses by applying the framework from the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility* (from http://www.uspto.gov/web/offices/pac/dapp/opla/preognotice/guidelines101_20051026.pdf) to show that claims 1-13 do not lack patentable utility, and that the claims are directed to a practical application of a judicial exception to 35 U.S.C. § 101 and are thus patentable.

The Interim Guidelines were issued by the USPTO to assist Examiners in determining whether the subject matter as claimed in a patent application is eligible for patent protection. *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility*, 1. The general rule is that “to be eligible for patent protection, the claimed invention as a whole must accomplish a practical application. That is, it must produce a ‘useful, concrete and tangible result.’” *Id.* at 1, citing *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368, 1373-74, 47 USPQ2d 1596, 1601-02 (Fed. Cir. 1999). Under the Interim Guidelines, Examiners determine on a case-by-case basis whether a claimed invention falls within a judicial exception to statutory subject matter (that is, it is nothing more than an abstract idea, law of nature, or natural phenomenon), or whether it is a practical application of a judicial exception to statutory subject matter, which is patentable. *Interim Guidelines* at 1-2. “[A] practical application of a 35 U.S.C. § 101 judicial exception is claimed if the claimed invention physically transforms an article or physical object to a different state or thing, or if the claimed invention otherwise produces a useful, concrete, and tangible result.” *Id.* at 2, emphasis added.

Patentable Utility

In evaluating the patentability of an invention with respect to meeting the utility requirement, the Examiner must first identify and understand any utility and/or practical application asserted for the invention. *Id.* To ensure that patent protection is extended only to

inventions that have a certain level of “real world” value, the invention, as a whole, must be useful and accomplish a practical application; that is, it must produce a useful, concrete, and tangible result. *Id.* To establish utility, “a complete disclosure should contain some indication of the practical application for the claimed invention,” such as a statement that explains the purpose of the invention or how the invention may be used. *Id.* The Interim Guidelines proceed to state that “[r]egardless of the form of statement of utility, it must enable one ordinarily skilled in the art to understand why the applicant believes the claimed invention is useful.” *Id.* at 5, emphasis added.

The method of claim 1 results in a calculated equivalent noise power. The language on the claim requires measuring of physical quantities and then determining and calculating various information, all in an effort to calculate the equivalent noise power. Applicant asserts that the application as filed contains several statements of the utility of the calculated equivalent noise power, all of which would have enabled one of ordinary skill in the art to understand why Applicant believes the language in claim 1 is useful and has practical applications. For example, paragraph [0034] states that

[t]he final value of equivalent noise power, σ_e^2 , can be used in any bit-loading algorithm that is designed specifically for Gaussian noise sources. For example, in one embodiment, the equivalent noise power calculated by the method 500 is used to determine the [signal-to-noise ratio] SNR for the sub-carrier. Subsequently, the SNR based on the equivalent noise power is used to determine a bit-loading for the sub-carrier in the presence of timing phase error. The resulting bit-error rate remains at target value even if the noise source is not purely Gaussian and consists of a timing phase error (i.e. phase noise).

Paragraph [0034], emphasis added. One of ordinary skill in the art of digital communication recognizes from these statements why Applicant believes the invention is useful: by using the equivalent noise power calculated by the method in any bit loading algorithm designed for Gaussian noise, the resulting bit-error rate remains at a target value even if the noise source is not purely Gaussian but rather also has a timing phase error. Thus, these statements satisfy the requirement that the statement of utility must enable one of ordinary skill in the art to understand why Applicant believes the language in claim 1 is useful.

Paragraph [0034] goes on to state that “[i]n another embodiment, the equivalent noise power is used to determine or analyze the bit-error rate of the signal.” Paragraph [0034],

emphasis added. One of ordinary skill in the art recognizes utility in this statement, because bit-error rate is commonly used as a performance metric in digital communication systems. Thus, the statement that the use of the equivalent noise power can be used to determine or analyze the bit-error rate of the signal would enable one of ordinary skill to understand not only that Applicant believes the invention is useful, but also that the equivalent noise power calculation has a practical application.

Another statement of utility appears in paragraph [0035], which states that “[i]n one embodiment, the method 500 is implemented more robustly by introducing hysteresis based on the calculated Gain Factor value. The result is an improved user experience, since fluctuation between phase noise compensation and non-compensation is minimized.” Paragraph [0035], emphasis added. Even one lacking ordinary skill in the art would recognize utility from these statements: by introducing hysteresis based on the calculated Gain Factor value, the user experience improves because fluctuation between phase noise compensation and non-compensation is minimized. Again, these statements satisfy the requirement that the statement of utility must enable one of ordinary skill in the art to understand why Applicant believes the language in claim 1 is useful.

As the Interim Guidelines note, although patent applicants may assert more than one utility, only one such assertion is necessary to fulfill the utility requirement. *Interim Guidelines* at 5. Having provided at least three compliant statements of utility, Applicant has thus established the utility of claim 1. Accordingly, Applicant respectfully requests the withdrawal of the rejection of claim 1 under 35 U.S.C. § 101. Because claims 2-13 depend from claim 1, Applicant asserts the utility of claims 2-13 has also been established, and Applicant respectfully requests withdrawal of the rejection of claims 2-13.

Also attached is a memo from the deputy director of the PTO by coincidence specifically pointing to words in a claim such as calculating and determining are sufficient to establish a useful, tangible result to satisfy 35 U.S.C. § 101. Accordingly, Applicant respectfully requests the withdrawal of the rejection of claim 1 under 35 U.S.C. § 101.

Practical Application of a Judicial Exception of 35 U.S.C. § 101

This section is provided in case the Examiner’s rejection of claims 1-13 was not grounded in a belief that Applicant did not adequately assert utility, but rather because the

Examiner believes claims 1-13 are not for a practical application of a 35 U.S.C. § 101 judicial exception, the analysis of which involves utility.

The Supreme Court has held that the scope of 35 U.S.C. § 101 includes “anything under the sun that is made by man.” *Interim Guidelines* at 11, citing *Diamond v. Chakrabarty*, 447 U.S. 303, 308-309, 206 USPQ 193, 197 (1980). Thus, any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if it meets the other requirements for patentability as established by 35 U.S.C. §§ 102, 103, and 112. *Id.* at 12, quoting *In re Alappat*, 33 F.3d 1526, 1540, 31 USPQ2d 1545, 1554 (Fed. Cir. 1994) (en banc).

Courts have found certain subject matter to be outside of the four statutory categories of process, machine, manufacture, or composition of matter. The excluded subject matter includes inventions that are limited to abstract ideas, laws of nature, and natural phenomena. *Interim Guidelines* at 13. “[S]ubject matter that is not a practical application or use of an idea, a law of nature or a natural phenomenon is not patentable.” *Id.*, emphasis in original. The implication of this statement is that subject matter that is a practical application or use of an idea, a law of nature, or a natural phenomenon is patentable.

The first step in determining whether an invention is a practical application of a 35 U.S.C. § 101 judicial exception is determining whether a claim falls within at least one of the four enumerated categories of patentable subject matter. *Id.* at 14-15. The *Interim Guidelines* note that “[t]he scope of 35 U.S.C. § 101 is the same regardless of the form or category of invention in which a particular claim is drafted.” *Id.* at 15. Thus, “[t]he question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to ... but rather on the essential characteristics of the subject matter, in particular its practical utility.” *Id.* at 15, quoting *State Street*, 149 F.3d at 1375, 47 USPQ2d at 1602. Notably, if the Examiner believes a claim is unpatentable, the burden is on the Examiner to set forth a prima facie case of unpatentability. *Interim Guidelines* at 16. Specifically, if the Examiner determines that the claimed subject matter more likely than not falls outside of all four statutory categories, the Examiner must provide an explanation. *Id.* Because the Examiner here did not provide an explanation of the rejection that indicated a conclusion that the subject matter falls outside of the four statutory categories, Applicant concludes the Examiner believes claim 1 falls into one of the four statutory categories.

The next step in the inquiry is to decide whether a claim is directed to nothing more than abstract ideas, such as mathematical algorithms, natural phenomena, and laws of nature, which are not patentable, *Id.* at 17, citing *Diamond v. Diehr*, 450 U.S. 175, 185, 209 USPQ 1, 7 (1981), or whether the claim as a whole is for a particular application of an abstract idea, natural phenomenon, or law of nature, which is patentable. *Interim Guidelines* at 17-18, emphasis in original. A claim is in the latter category, i.e., a practical application of a judicial exception exists, if the claimed invention “transforms” an article or physical object to a different state or thing, or if the claimed invention otherwise produces a useful, concrete, and tangible result. *Id.* at 19. The second alternative is relevant here. “In determining whether the claim is for a ‘practical application,’ the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the final result achieved by the claimed invention is ‘useful, tangible and concrete.’” *Id.* at 20, emphasis in original.

The first requirement of a “practical application” is that the claimed invention be useful. In particular, the utility of the invention must be specific, substantial, and credible. *Id.* at 20-21, citing M.P.E.P. § 2107. Paragraphs [0034] and [0035], among others in the specification, describe specific utility that is both substantial and credible. Paragraph [0034] describes how when the equivalent noise power is used in bit loading algorithms, the resulting bit-error rate remains at a target value even if the noise source is not purely Gaussian, which is a substantial utility because a constant bit-error rate is considered by those skilled in the art of digital communication to be a desirable characteristic of digital communication systems. Furthermore, the Examiner has cited no evidence that the utility described in paragraph [0034] is not credible. Likewise, paragraph [0035] describes that the introduction of hysteresis based on the value of the Gain Factor results in an improved user experience because fluctuation between phase noise compensation and non-compensation is minimized. This utility is also substantial because product vendors in many fields commonly try to provide a positive user experience. Here, too, the Examiner has provided no argument or evidence that the utility described in paragraph [0035] is not credible. Thus, claim 1 meets the requirement of providing utility that is specific, substantial, and credible.

The second requirement of a “practical application” is that a process claim must set forth a practical application of a 35 U.S.C. § 101 judicial exception to produce a real-world result. *Interim Guidelines* at 21. PTO memorandum 101 clarifies the test and cites as an example of

patentable subject matter an improved method for measuring blood sugar levels in human beings. PTO memorandum 101. Specifically, the memorandum states “the end result is the blood sugar level which is a practical application for diagnostic purposes. Accordingly, reciting the improved method, and the result it achieves – the measurement of the blood sugar level – is all that is necessary for patent-eligibility. The diagnostic steps that occur after the determination of the blood sugar level need not necessarily be present in the claims in order for the claims to be statutory.” *Id.*

Claim 1 recites a method to calculate an equivalent noise power. Like the blood sugar level in the example from PTO memorandum 101, this equivalent noise power has various real-world applications, as described in the specification. Paragraph [0034] describes how the equivalent noise power may be used in bit-loading algorithms, the results of which provide communication at a target bit-error rate, even in the presence of timing error. Paragraph [0034] also describes how the equivalent noise power may be used to determine or analyze the bit-error rate of the signal. Because bit-error rate is a common performance metric in digital communication systems, the use of the equivalent noise power in determining or analyzing the bit-error rate of a signal is a real-world application. Thus, by stating the improved method and the result it achieves – an equivalent noise power – claim 1 satisfies the requirements for patent-eligibility as defined in the Interim Guidelines and PTO memorandum 101.

The third and final requirement of a “practical application” is that the invention must produce a “concrete” result. *Interim Guidelines* at 22. In particular, a process must have a result that can be substantially repeatable, or the process must substantially produce the same result again. *Id.* Whether a process is substantially repeatable or substantially produces the same result depends on the level of skill in the art. *Id.* Claim 1 recites a method to calculate an equivalent noise power by measuring phase noise in a signal, determining a Gaussian noise power level in the signal, calculating a gain factor associated with the phase noise, and applying the gain factor to the Gaussian noise power level to calculate an equivalent noise power. When used by one of ordinary skill in the art, none of these procedures is likely to yield, either alone or in combination, a result that is not substantially repeatable. Specifically, one of ordinary skill in the art would recognize that by using the method as claimed, substantially repeatable results would be obtained.

Through the preceding analysis, Applicant has shown that claims 1-13 are directed to a practical application of a 35 U.S.C. § 101 judicial exception, and that a useful, tangible, and concrete result is produced by claim 1. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 1 under 35 U.S.C. § 101. Because claims 2-13 depend from claim 1, Applicant also respectfully requests withdrawal of the rejections of claims 2-13.

Response to Rejection of Claims 14-26 under 35 U.S.C. § 101

Claims 14-26 stand rejected under 35 U.S.C. § 101. The Examiner asserts the claimed invention is directed to non-statutory subject matter. In particular, the Examiner asserts that claim 14 is directed to a computer program listing and refers Applicant to page 53 of the Interim Guidelines. Applicant traverses and asserts that claim 14 is not directed to a computer program listing but rather to a machine-readable medium storing executable instructions to cause a device to perform a method, and thus is patentable subject matter.

As amended, claim 14 reads:

A machine-readable medium storing executable instructions to cause a device to perform a method comprising:

measuring phase noise in a signal, the phase noise due to a sampling-time phase mismatch between a transmitter device and a receiver device;

determining a Gaussian noise power level in the signal;

calculating a gain factor associated with the phase noise; and

applying the gain factor to the Gaussian noise power level to calculate an equivalent noise power.

In the rejection of claims 14-26, the Examiner cited page 53 of the Interim Guidelines, which addresses the patentability of computer programs. However, page 53 also distinguishes between computer programs claimed as computer listings, which is not what claim 14 recites, and a computer-readable medium encoded with a computer program. *Interim Guidelines* at 53.

Computer listings are non-statutory; a computer-readable medium encoded with a computer program is statutory:

[C]omputer programs claimed as computer listings *per se*, i.e., the descriptions or expressions of the programs, are not physical “things.” They are neither computer components nor statutory processes, as they are not “acts” being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program’s functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program’s functionality to be realized, and is thus statutory.

Id., emphasis in original.

Because claim 14 recites a machine-readable medium storing executable instructions to cause a device to perform a method, the claim is statutory per the Interim Guidelines. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 14 under 35 U.S.C. § 101. In addition, because claims 15-26 depend from claim 14, Applicant also respectfully requests withdrawal of the rejections of claims 15-26.

Note, now that applicants have established that claim 14 recites a machine-readable medium storing executable instructions, which does meet the 35 U.S.C. § 101 requirements, the Manual of Patent Examining Procedure (M.P.E.P.) § 2106 outlines statutory claim language for software related inventions. In some of the relevant sections, M.P.E.P. § 2106 states:

The claimed invention as a whole must accomplish a practical application. That is, it must produce a “useful, concrete and tangible result.” *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 149 F. 3d 1368, 1373, (Fed. Cir. 1998).

patentable subject matter [in] the claims [is] defined [as] “a specific machine to produce a useful, concrete, and tangible result.” *In re Alappat*, 33 F.3d 1526, 1544, (Fed. Cir. 1994).

Office personnel should begin their evaluation of a computer-related invention as follows:

- determine what the programmed computer does **when** it performs the processes dictated by the software. (M.P.E.P. § 2106 Patentable Subject Matter - Computer-Related Inventions)

"functional descriptive material" consists of data structures and computer programs which impart functionality **when** employed as a computer component. **When** functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. (MPEP § 2106)

Claim 14 adheres to the above format and 'Office personnel should begin their evaluation of a computer-related invention by determining what the programmed computer does **when** it performs the processes dictated by the software.'

Allowable Subject Matter

Applicant thanks the Examiner for the allowance of claims 27-44.

CONCLUSION

Applicant respectfully submits that in view of the amendments and remarks set forth herein, the rejections and objections have been overcome. An Information Disclosure Statement is also submitted with this amendment. Applicants reserve all rights with respect to the application of the doctrine of equivalents. If there are any additional charges, please charge them to our Deposit Account No. 02-2666. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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